

CLAIMS:

1. A method of controlling the output power of a permanent magnet electric motor, the method including:
- 5 (a.) setting a limit value of motor output power;
- (b.) detecting a speed value of the electric motor;
- (c.) processing said obtained speed value and said limit value of output power so as to provide a target torque value; and
- (d.) processing said target torque value so as to provide a control signal for
- 10 adjusting an electric current supplied to the electric motor to thereby vary the output torque of the electric motor toward the target torque value.
2. A method as claimed in claim 1, wherein the limit value of output power is set at a value indicative of an output power limit.
- 15 3. A method as claimed in claim 2, wherein the output power limit is that of the electric motor.
4. A method as claimed in any one of the preceding claims, wherein the limit value of
- 20 output power is a value determined by using a processing function which maps the detected speed value to the predetermined target torque value.
5. A method as claimed in claim 4, wherein the mapping of the detected speed value to the target torque value is derived using a relationship that defines a mapping between a
- 25 continuum of speed values and the limit value of output power.
6. A method as claimed in any one of the preceding claims, wherein the target torque value is calculated by using the equation:

30

$$\tau = \frac{P}{\omega}$$

where:

- 22 -

τ = target value of output torque required;

P = limit value of motor output power; and

ω = detected speed value.

- 5 7. A method as claimed in any one of the preceding claims, wherein the limit value is determined with regard to losses in the electric motor and any drive system associated with the motor.
8. A method as claimed in any one of the preceding claims, wherein the electric current
10 is supplied by at least one battery and the limit value of output power is determined with regard to the output power capacity of the at least one battery.
9. A method as claimed in any one of the preceding claims, wherein power supplied to the electric motor is controlled by controlling the output power of the motor in light of
15 knowledge of the efficiency of the motor.
10. A method as claimed in any one of the preceding claims, wherein the output torque is varied to be substantially identical to the target torque value.
- 20 11. A method as claimed in any one of claims 1-9, wherein the output torque is varied to be within a predetermined range that includes the target torque value.
12. A method as claimed in any one of the preceding claims, wherein the control signal has a duty cycle adapted to adjust a switching pattern of a power controller that supplies
25 current to the electric motor.
13. A control system for controlling the output power of a permanent magnet electric motor, the control system including:
- (b) a limiter means for:
- 30 i. setting a limit value of output power;
- ii. detecting a speed value of the electric motor; and
- iii. processing said detected value of speed and said limit value of output power so as to provide a target torque value signal; and

- (b.) a control means for processing said target torque value signal so as to provide a control signal for adjusting an electric current supplied to the electric motor to thereby vary the output torque of the electric motor toward the target torque value.

5

13. A control system as claimed in claim 12, wherein the control system and the electric motor form a part of an electric drive or traction system.

10

14. A control system as claimed in claim 12 or 13, including a power controller for controlling the current supplied to the motor.

15. A system as claimed in any one of claims 12-14, wherein the electric current is supplied by at least one battery.

15

16. A system as claimed in any one of claims 12-15, wherein the control means includes a torque controller and a current controller, said torque controller receiving said target torque value signal and an optional throttle signal so as to provide an output current control signal to the current controller, said current controller also receiving a phase current feedback signal from the power supplied to the motor and outputs said control signal.

20

17. A system as claimed in claim 16, further including an input power capability estimator fed with a signal indicative of power being drawn from an electrical power source supplying the motor, said input capability power estimator supplying a signal to an input power estimator indicative of the power available to be drawn from the power source, and said input power estimator providing an output signal input to the limiter indicative of the power consumption of the motor.

25

18. A programmed computer for controlling the output power of a permanent magnet electric motor for an electric traction system for a vehicle, the programmed computer including:

30

- (c.) a processing means;

- 24 -

- (d.) a memory for storing executable instructions, said executable instructions being executable by the processing means to make the processing means:
- i. set a limit value of output power for the motor;
 - ii. detect a speed value of the electric motor;
 - 5 iii. process said detected speed value and said limit value of output power so as to provide a target torque value; and
 - iv. process said target torque value so as to provide a control signal for adjusting an electric current supplied to the electric motor so as to vary the output torque of the electric motor toward the target torque
 - 10 value.

19. A method of controlling the output power of a permanent magnet electric motor substantially as hereinbefore described with reference to the accompanying drawings.

- 15 20. A system for controlling the output of a permanent magnet electric motor substantially as hereinbefore described with reference to the accompanying drawings.

21. A programmed computer for controlling the output of a permanent magnet electric motor as claimed in claim 18 substantially as hereinbefore described with reference to
- 20 the accompanying drawings.